Threads of Mission Success

Project Management Challenge 2006
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Threads of Mission Success

A Project Manager Has Many Threads to Work With

- NASA/JPL Interaction & Communications
- NASA/JPL Institutional Requirements
- Planning
- Mission/System Reqts/Design/Implement
- Science Interaction
- Technical Division/Section Interaction
- Financial
- Assessment, Review and Control
- US and Foreign Partner Interaction
- Verification & Validation
- Safety and Mission Assurance
- Independent Assessment, Review & Reporting

Threads of Mission Success

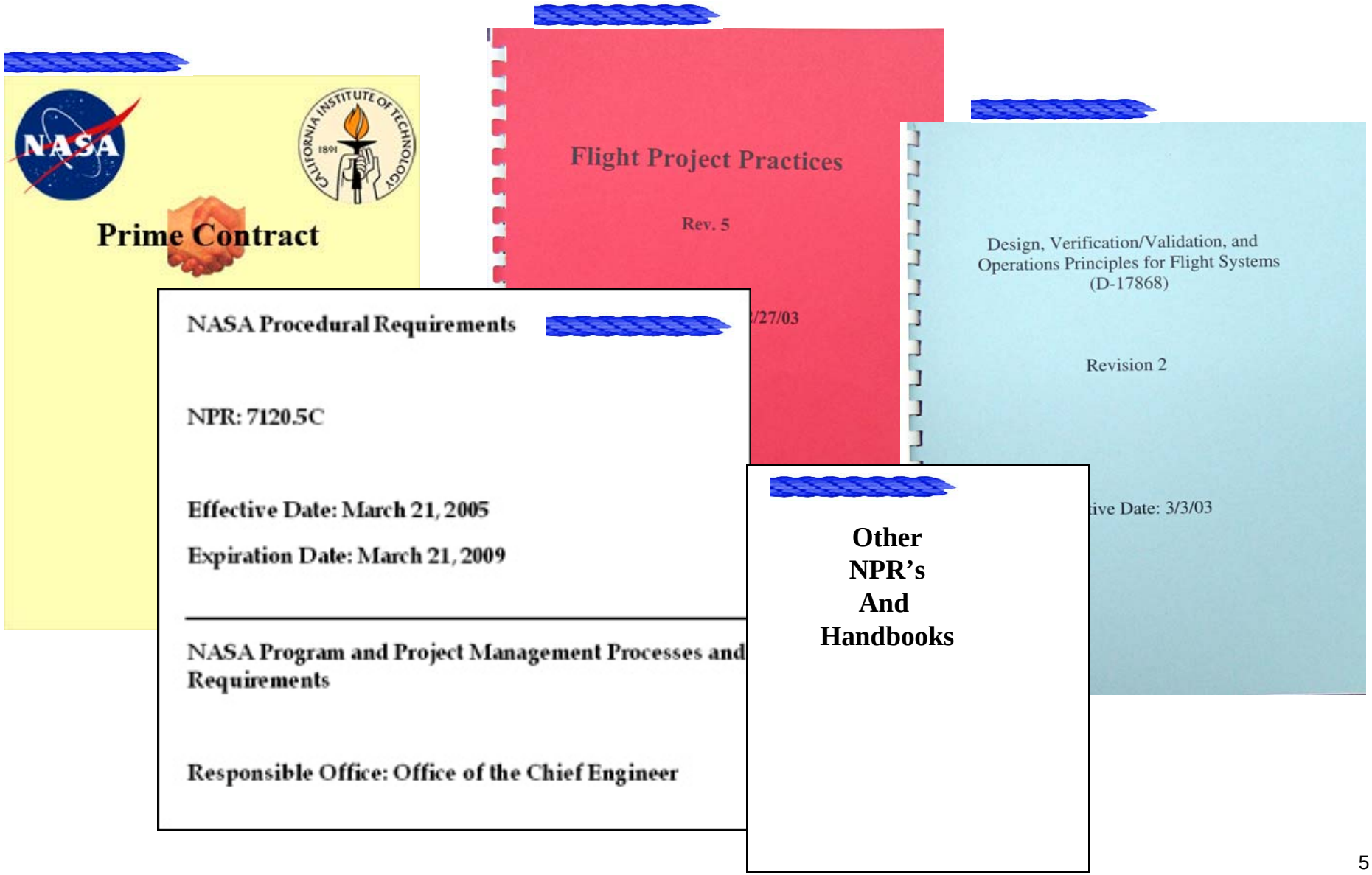
Threads are:

- Key topics and interactions that:
  - Are critical to mission success
  - The PM has to pay attention to continuously
- Highly interactive with each other:
  - If one thread is compromised, the whole mission may be compromised
- Topics form the basis of a JPL Project Manager Workshop

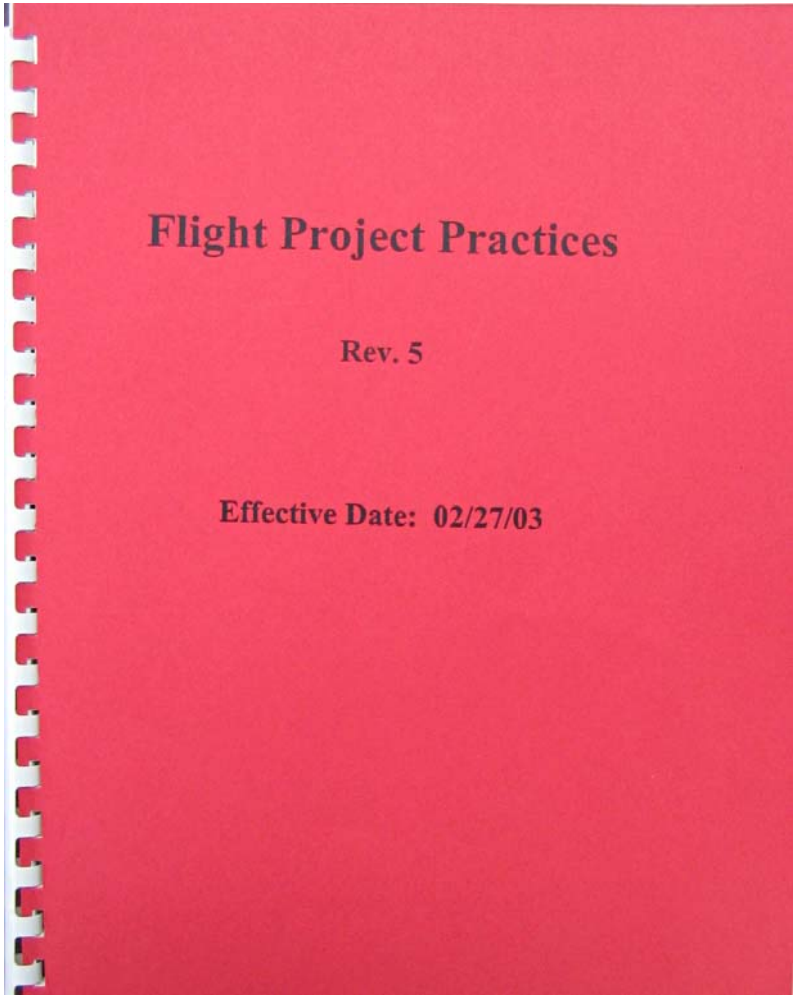
NASA/JPL Interaction & Communication

- NASA Mission Directorate Roles and Responsibilities
- JPL Director/Director for Roles and Responsibilities
- Program Manager Roles and Responsibilities
- Project Manager Roles and Responsibilities
- Working With Other Centers
- Regulatory Agreements
  - Launch Approval, Planetary Protection, Export Control, Frequency Assignment……
- Support Agreements
  - Launch Services, DSMS…….
- Reviews
  - Status Reviews, Significant Events
  - Milestone & Decision Reviews
- Independent Assessments
- Key personnel
  - Coordination before changes

NASA/JPL Institutional Requirements



Flight Project Practices

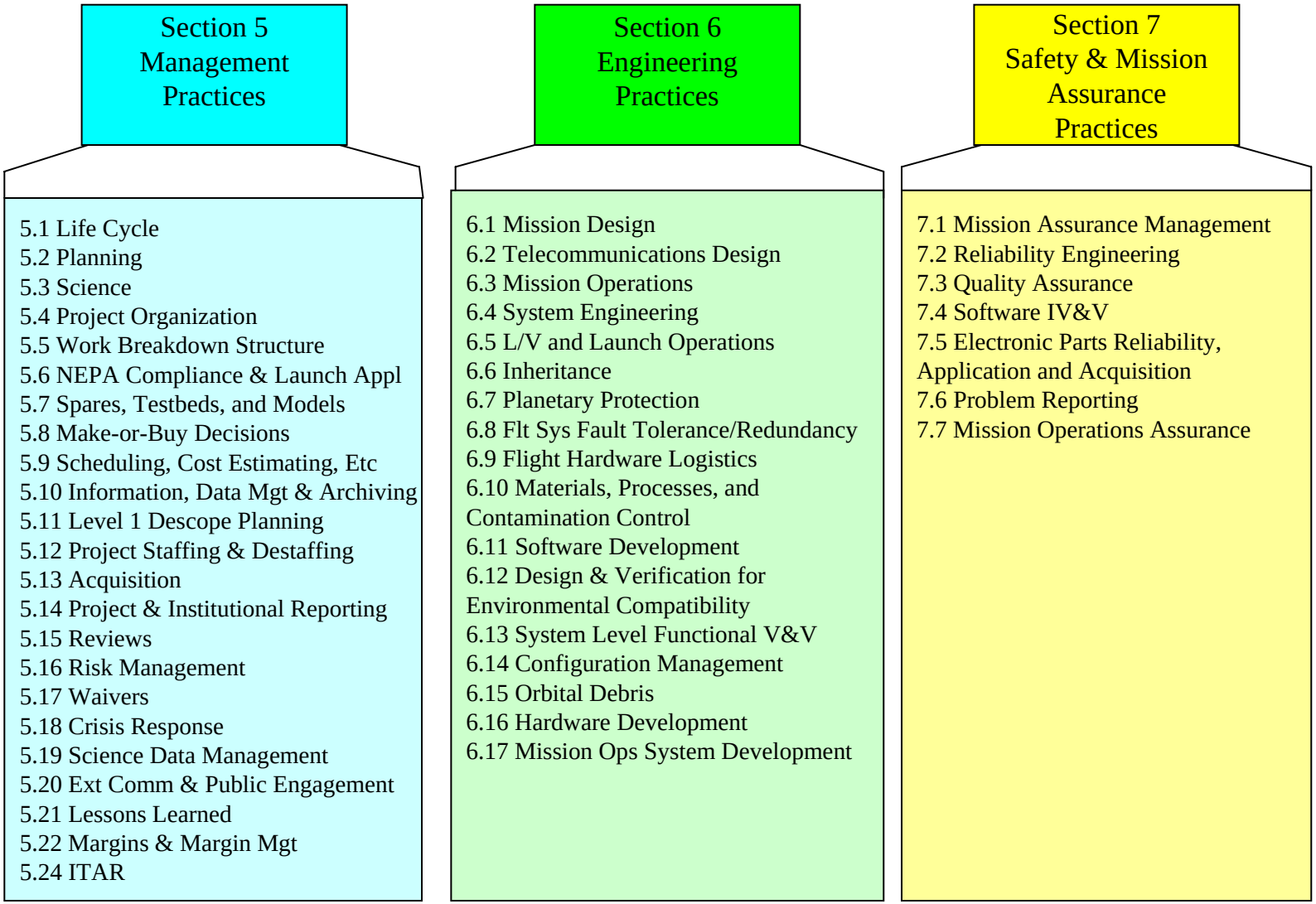


(Rules! DocID 58032)

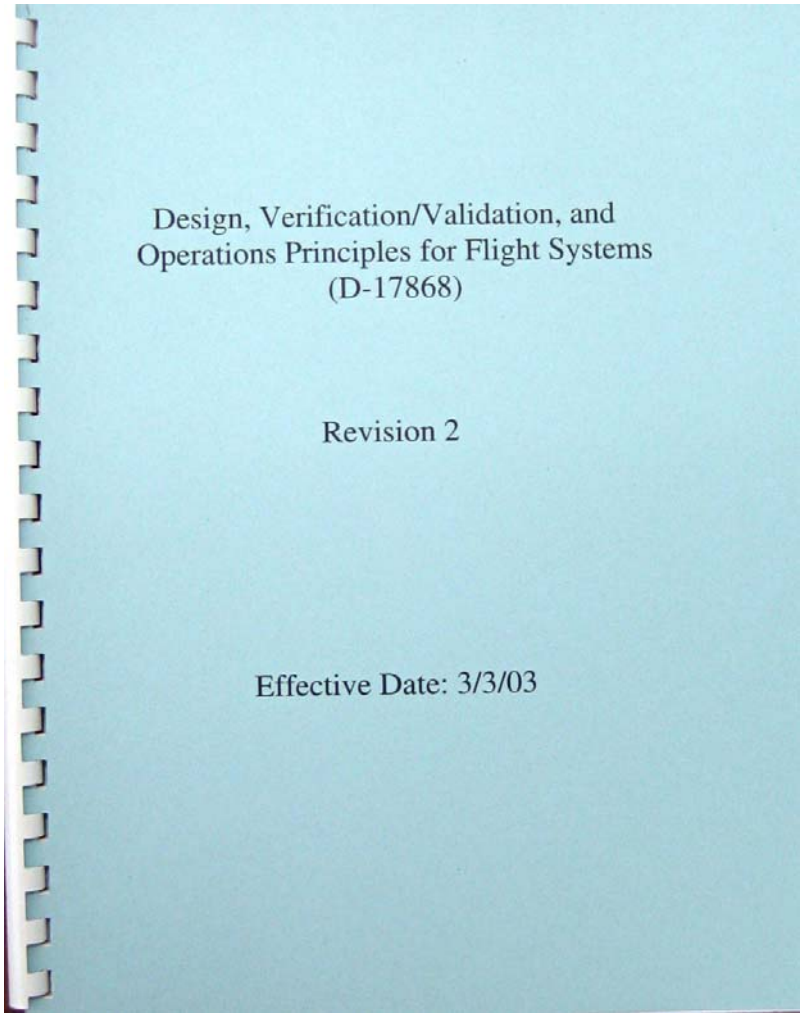
- Applies to all projects regardless of implementation mode
- Specifies what projects are required to do
- Projects meet requirements, or get approval for deviation/exception
- Communicates the JPL way of doing business, both internally and to sponsors
- Provides for projects the JPL implementation of 7120.5
- Establishes standards of uniformity
- Initial compliance assessment is via the FPP Compliance Matrix
- Compliance verification process
- Deviations/Exceptions process
- Flight practices

Flight Project Practices Rev 5 Content

Note: Sections 1-4 are Applicability, Purpose, Implementation, and Approval/Change Authority



Design Principles



(Rules! DocID 43913)

- Applies to all flight designs, whether implemented in-house or at a contractor
- Specifies essential attributes of JPL flight designs
- Projects meet requirements, or get approval for deviation/exception
- Captures 40+ years of lessons learned
- Establishes robust design margins for high reliability
- Defines ample margins for management of development risk
- Defines a level of risk acceptable to management
- Engages management in dialog, when deviations are taken, of the risks being accepted
- Prevents management from being surprised by unacceptable risk at a time when it is too late to change the outcome
- Initial compliance assessment is via the DP Compliance Matrix
- Compliance verification process
- Deviations/Exceptions process
- Design principles

Design Principles Rev 2 Content

Note: Sections 1 and 2 are Applicability and Introduction

Section 3 Mission Design

Section 4 Flight System Design

- 4.1 General
- 4.2 Mechanical Configuration/Systems
- 4.3 Power/Pyrotechnics
- 4.4 Information System
- 4.5 Telecommunications System
- 4.6 Guidance, Navigation & Control
- 4.7 Propulsion System
- 4.8 System Thermal
- 4.9 System Fault Protection
- 4.10 System EMC/EMI
- 4.11 Flight Software System
- 4.12 Flight Hardware System

Section 5 Software

Section 6 Managed Margins

- 6.1 Project Programmatic Resource Margins
- 6.1.1 Budget Reserve
- 6.1.2 Schedule Margin
- 6.2 Mission Design Resource Margins
- 6.2.1 Propellant
- 6.3 Flight System Development Resource Margins
- 6.3.1 General
- 6.3.2 System Mass
- 6.3.3 System Power
- 6.3.4 System Energy
- 6.3.5 Flight Software Margins
- 6.3.6 Power/Pyro System Margins
- 6.3.7 Telecom System Margins
- 6.3.8 Flight Hardware Margins

Section 7 Flight Sequence Design

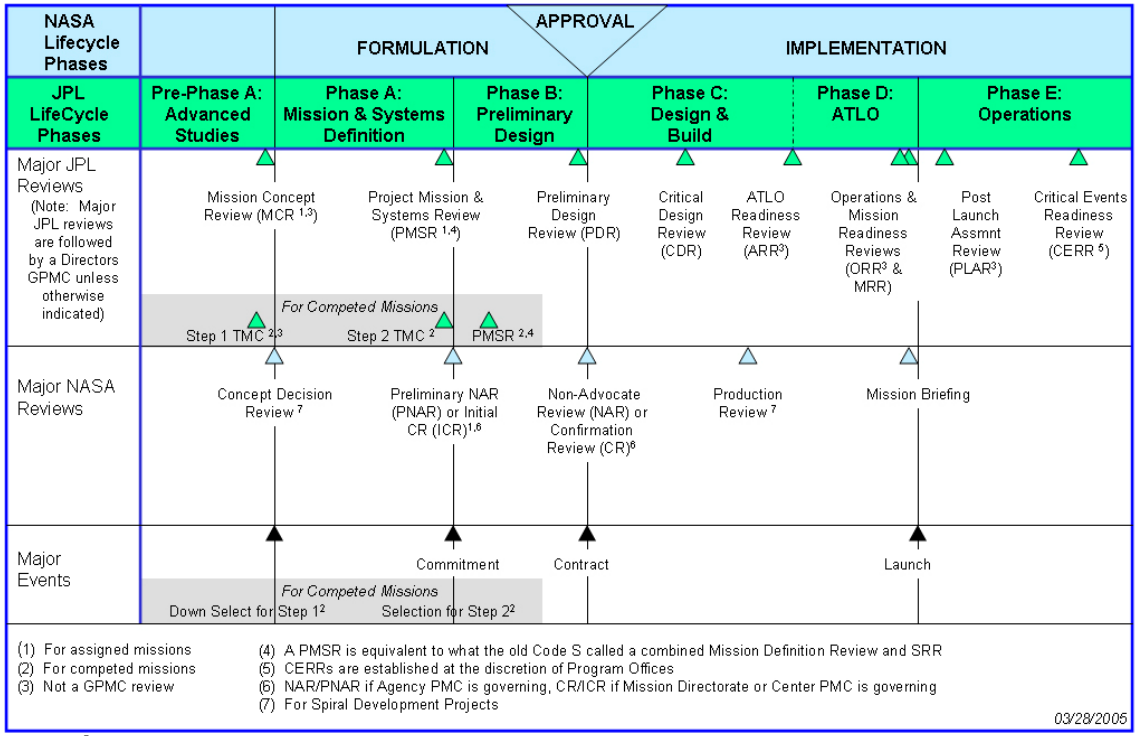
Section 8 Flight System V&V Design

- 8.1 General
- 8.1.1 Min Op Times for Electronics
- 8.1.2 Handling & Test Constraints
- 8.2 Pre-delivery Verification
- 8.2.1 Subsystem and Assembly Level
- 8.2.2 Early Interface Testing
- 8.2.3 System Level
- 8.3 System Assembly, Integration & Test
- 8.3.1 System Assembly
- 8.3.2 System Integration
- 8.3.3 System Functional Verification
- 8.3.4 Flight Sequence Verification
- 8.3.5 System Fault Protection Verification
- 8.3.6 System Stress Testing
- 8.3.7 System Environmental Verification
- 8.3.8 Inter-system Verification
- 8.4 Launch Operations
- 8.4.1 Pre-mate Verification
- 8.4.2 Post-mate Verification

Section 9 Flight System Flight Ops Design

Planning

- JPL Project Lifecycle
  - Phase Transitions
- Gate Products
- Organization
- Standard WBS
- Integrated Scheduling
- Project Plan and PIP
- Acquisition Strategies
- Contingencies
  - Margins, Reserves, Options, Descopes
- JPL Institutional Support
  - Project Support Team, Templates,
  - PSO Website, Costing Office, Scheduling Section…..



Mission/System Reqts/Design/Implement

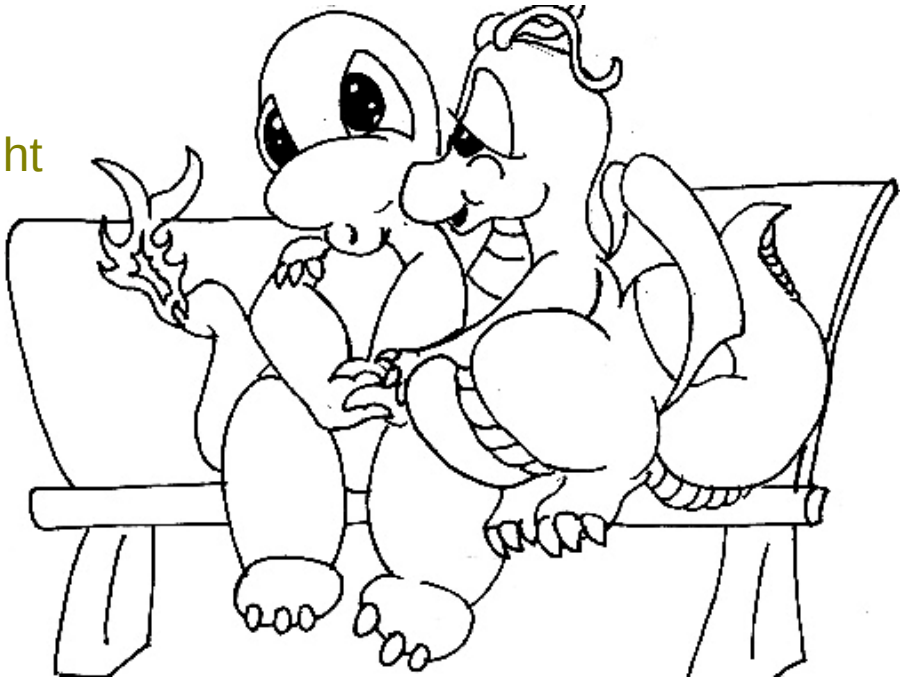
- Design Principles
- System Engineering
  - Project, Flight, Ground
- Requirements Flowdown
- System Acquisition
- Inheritance
- Software
- Technology Infusion
- System Complexity
- Cross System Trades
  - Flight System drivers on MOS, etc.
- Integration and Test
  - Payloads/Subsystems from many diverse suppliers
- Technical Resource Management
- Materials and Processes

Science Interaction

- Project Manager and PI Roles and Responsibilities
- Science Objectives/Requirements
- Science Management
  - Organization, teams
- Science Data
  - Acquisition, management, analysis, distribution, archiving
- Education and Public Outreach

JPL Technical Division/Section Interaction

- Implementing Projects Within JPL's Matrix Organization
- Project Roles and Responsibilities
- Technical Division/Section Roles and Responsibilities
  - Co-chair Design Reviews
  - Peer Reviews
  - Contractor Insight/Oversight
- Staffing/Destaffing
- Quiet Hours

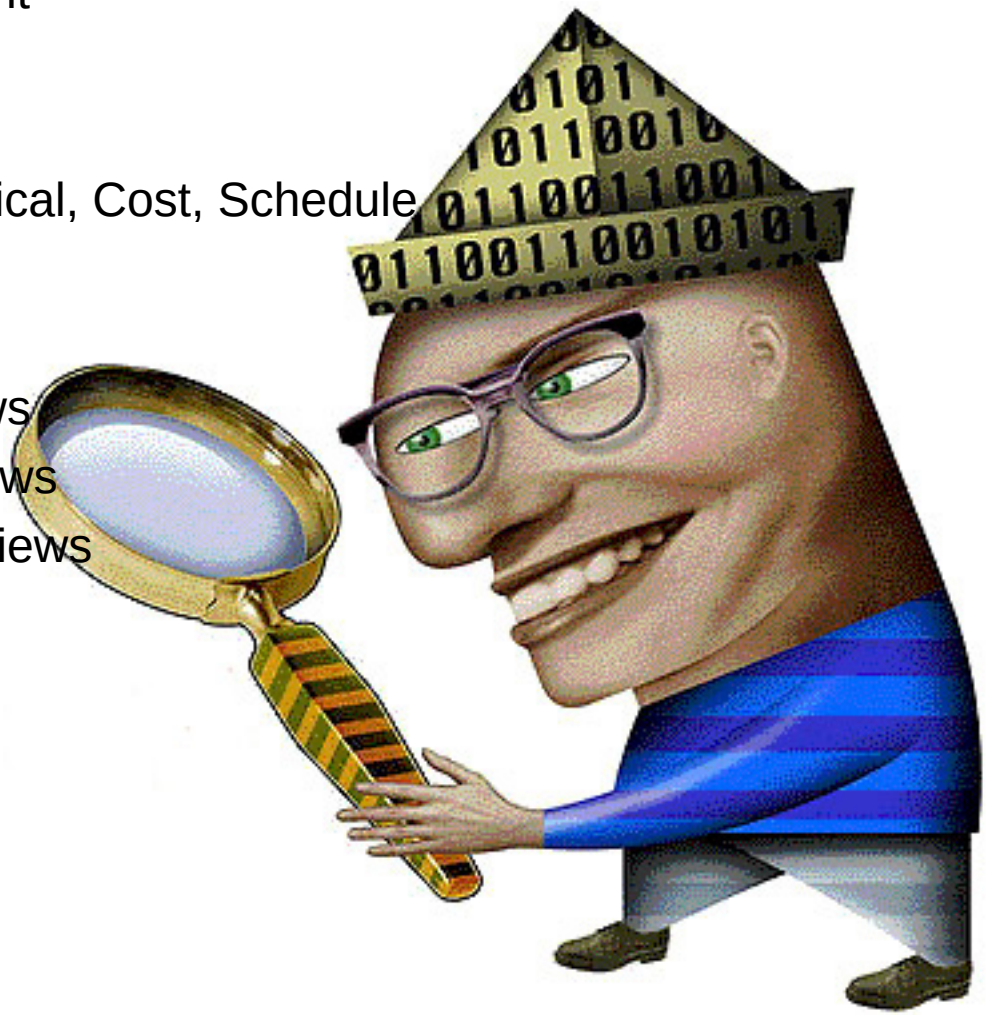


Financial

- Project Cost Estimation
  - Cost Database
  - Costing Guidelines
- Standard WBS
- Earned Value
- Cost Risk Analysis
- Budget Reserves
  - Reserve Requirements
  - Reserve Use Strategy
- Cost Liens
- Costing Office
- 533 Reporting

Assessment, Review and Control

- Information Management
- Configuration Management
- Deviations and Waivers
- Risk Management
  - Programmatic, Technical, Cost, Schedule
- Compliance Matrices
- Reviews
  - JPL Milestone Reviews
  - NASA Decision Reviews
  - MMRs, Quarterly Reviews



US and Foreign Partner Interaction

- NASA, JPL, US Partners and Foreign Partners Roles and Responsibilities
  - May involve other agencies
- MOU's
  - Foreign Partners, Other Centers
- Acquisition Process
- Collaboration
  - Geographically distributed partners
  - Information Sharing
  - Cultural issues
- Export Control/ITAR
  - TAA
- Risk and Cost sharing

Verification & Validation

- V&V Matrix
- Incompressible Test List
- All Levels
  - Project
  - Flight System, Subsystems, Assemblies, Parts
  - Software
    - IV&V
  - ATLO
  - Ground System
  - Mission Operations
- Test as You Fly/Fly as You Test
- Certification of Flight Readiness

Safety & Mission Assurance

- Roles and Responsibilities
  - Mission Assurance
  - Systems Safety
  - Environmental Assurance
  - Reliability
  - Parts
  - HW and SW Quality Assurance
  - Environmental Health and Safety
- SMA Interaction with Mission and Flight System Teams
  - How much SMA
- SMA Interaction with US and Foreign Partners
  - Other NASA centers, Industrial, Educational, Foreign…….
- Mission Operations Assurance
  - Post Launch SMA Roles & Responsibilities

Independent Assessment, Review & Reporting

- JPL Red Teams
- SMQA Risk Matrix
- NASA Directorate/Agency GPMCs
- IPAO
- ITA

Weaving the Threads of Mission Success

A Project Manager Weaves A Successful Mission from A Broad Collection Of Threads